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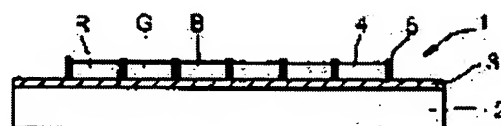
TANI MIZUHITO

(54) COLOR FILTER FOR DISPLAY DEVICE, AND DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a color filter for display device capable of making pixel shape, making the optical density of a light shielding layer high and making contrast high in the case of forming the color filter for display device by an ink jet method, and to provide a display device using the color filter and excellent in display quality.

SOLUTION: In this color filter 1 for display device provided with a transparent substrate 2, an image receiving layer 3, a matrix light shielding layer 5 and a pattern coloring layer 4 formed by the ink jet method, the material of the light shielding layer is defined as the mixture of carbon black or organic pigment. Besides, this display device is provided with the color filter 1.



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CLAIMS

[Claim(s)]

[Claim 1] The color filter for indicating equipments characterized by for the protection-from-light material of this matrix-like protection-from-light layer to be carbon black in the color filter for indicating equipments possessing the pattern-like coloring layer formed by the ink-jet method at least between the transparence substrate, the television layer formed on this transparence substrate, the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer.

[Claim 2] The color filter for displays according to claim 1 with which said color filter for displays is characterized by providing at least a transparence substrate, the television layer formed on this transparence substrate, the matrix-like protection-from-light layer formed on this television layer, the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layers on this television layer, and a flat layer.

[Claim 3] Claim 1 to which the content of the carbon black which is the protection-from-light material of said matrix-like protection-from-light layer is characterized by being 50 - 120 % of the weight to 100 % of the weight of resin contained in a matrix-like protection-from-light layer, or the color filter for displays according to claim 2.

[Claim 4] The television layer formed on a transparence substrate and this transparence substrate at least, In the color filter for displays possessing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer The black resin constituent used for formation of this matrix-like protection-from-light layer Acrylic resin, Coloring matter, a dispersant, a polymerization nature monomer, a polymerization initiator, and a solvent are used as a principal component. The color filter for displays characterized by being the mixture of the organic pigment formed into false black combining a yellow pigment, red pigments, and a blue pigment, combining the yellow pigment of the organic pigments to which this coloring matter has light transmission nature in a light field, a blue pigment, and a purple pigment.

[Claim 5] The color filter for displays according to claim 4 characterized by being the mixture of an organic pigment with which the range of said coloring matter is 1:1:1-2:2:1, or it formed this yellow pigment, the blue pigment, and the purple pigment into false black combining this yellow pigment, red pigments, and a blue pigment in 1:1:1-1:2:2.

[Claim 6] Claim 4 to which said coloring matter is characterized by making the mixture of this organic pigment contain carbon black, or the color filter for displays according to claim 5.

[Claim 7] The color filter for displays according to claim 6 with which the content of said carbon black is characterized by being 1 - 30 % of the weight to 100 % of the weight of mixture of this organic pigment.

[Claim 8] The color filter for displays according to claim 1 to 7 with which optical density of said matrix-like protection-from-light layer is characterized by being 3.0 or more.

[Claim 9] The display characterized by having a color filter for displays according to claim 1 to 8.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the color filter for indicating equipments and indicating equipment which are manufactured especially by the ink jet method about the color filter for indicating equipments and indicating equipments, such as a field emission mold indicating equipment, a fluorescence indicating equipment, a plasma display (PDP), and a liquid crystal display.

[0002]

[Description of the Prior Art] In the display, it is a useful means to use a color filter for the purposes, such as color display, reduction of a reflection factor, an improvement of contrast, and spectral characteristic control. In many cases, the color filter used for this display is used for a color filter, being formed as a pixel. as the approach used so far as an approach of forming the pixel of this color filter for displays -- photograph RISOGURAFII -- law, print processes, etc. are raised.

[0003] The technique which applies the pixel formation approach by the ink jet method used by the printer to manufacture of the color filter for displays is proposed to the approach of forming these pixels. However, in the approach of forming the color filter for indicating equipments by the ink jet method, since it is easy to generate scattering of the ink particle by the ink jet, and a blot of ink, and the pixel configuration of a color filter is clear and a pixel edge is sharp, the optical density of a matrix-like protection-from-light layer is high, and it is difficult to obtain the high color filter for indicating equipments of contrast.

[0004]

[Problem(s) to be Solved by the Invention] The technical problem of this invention generates neither scattering of the ink particle which injected the color filter for indicating equipments from the nozzle in the approach of forming by the ink jet method, nor a blot of ink, and and the pixel configuration of a color filter is clear and a pixel edge is sharp, the optical density of a matrix-like protection from light layer is high, and it is to offer [offering the high color filter for indicating equipments of contrast, and] the indicating equipment with sufficient display quality using this color filter for indicating equipments.

[0005]

[Means for Solving the Problem] The television layer by which invention of the first of this invention was formed at least on a transparence substrate and this transparence substrate, In the color filter for displays possessing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer It is the color filter for displays characterized by the protection-from-light material of this matrix-like protection-from-light layer being carbon black.

[0006] This invention is set to the color filter for displays of the above-mentioned invention. Said color filter for displays at least Moreover, a transparence substrate, The television layer formed on this transparence substrate, and the matrix-like protection-from-light layer formed on this television layer, It is the color filter for displays characterized by providing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layers on this television layer, and a flat

layer.

[0007] Moreover, this invention is a color filter for indicating equipments with which the content of the carbon black which is the protection-from-light material of said matrix-like protection-from-light layer is characterized by being 50 - 120 % of the weight to 100 % of the weight of resin contained in a matrix-like protection-from-light layer in the color filter for indicating equipments of the above-mentioned invention.

[0008] The television layer by which invention of the second of this invention was formed at least on a transparence substrate and this transparence substrate, In the color filter for displays possessing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer The black resin constituent used for formation of this matrix-like protection-from-light layer Acrylic resin, Coloring matter, a dispersant, a polymerization nature monomer, a polymerization initiator, and a solvent are used as a principal component. It is the color filter for displays characterized by being the mixture of the organic pigment formed into false black combining a yellow pigment, red pigments, and a blue pigment, combining the yellow pigment of the organic pigments to which this coloring matter has light transmission nature in a light field, a blue pigment, and a purple pigment.

[0009] Moreover, it is the color filter for displays characterized by being the mixture of the organic pigment which the range of said coloring matter is 1:1:1-2:2:1 about this yellow pigment, a blue pigment, and a purple pigment, or this invention formed into false black in the color filter for displays of the above-mentioned invention combining this yellow pigment, red pigments, and a blue pigment in 1:1:1-1:2:2.

[0010] Moreover, this invention is a color filter for indicating equipments with which said coloring matter is characterized by making the mixture of this organic pigment contain carbon black in the color filter for indicating equipments of the above-mentioned invention. Moreover, the color filter for displays with which the content of said carbon black is characterized by being 50 - 120 % of the weight to 100 % of the weight of mixture of this organic pigment.

[0011] Invention of the third of this invention is a color filter for displays with which optical density of said matrix-like protection-from-light layer is characterized by being 3.0 or more.

[0012] Invention of the fourth of this invention is a display characterized by having a color filter for displays by the above-mentioned invention.

[0013]

[Embodiment of the Invention] The color filter for displays by this invention is explained at a detail based on the 1 operation gestalt below. Drawing 1 is the top view showing one example of the color filter for displays by this invention. Moreover, drawing 2 is the A-A' sectional view of one example of the color filter for displays by this invention shown in drawing 1. As shown in drawing 1 and drawing 2, the color filter for displays (1) a television layer (3) is formed on a transparence substrate (2), and a matrix-like protection-from-light layer (5) forms on this television layer -- having -- between the matrix-like protection-from-light layers (5) on this television layer (3) -- red (R), green (G), and blue (B) -- each pattern-like coloring layer (4) is formed.

[0014] Drawing 3 is the sectional view showing other examples of the color filter for displays by this invention. As shown in drawing 3, the color filter for displays (1) A television layer (3) is formed on a transparence substrate (2), and a matrix-like protection-from-light layer (5) is formed on this television layer. Between the matrix-like protection-from-light layers (5) on this television layer (3) red (R), green (G), and blue (B) -- the flat layer (6) is formed all over the transparence substrate with which each pattern-like coloring layer (4) was formed, and the pattern-like coloring layer (4) was formed. For this reason, the color filter (1) top for displays is in the flat condition.

[0015] As for the transparence substrate (2) used for this invention, in drawing 1 and drawing 2, what has sufficient reinforcement, surface smoothness, thermal resistance, light transmission nature, etc. is desirable. For example, the transparent alkali free glass usually used as a color filter substrate or soda glass is raised. In case a pattern-like coloring layer (4) is formed by the ink jet method, the television layer (3) in this invention is prepared in order to prevent scattering of the ink particle by the ink jet, and

generating of a blot of ink.

[0016] As an ingredient of the television layer (3) in this invention, engine performance, like a transparent thing, that there are no discoloration and tenebrescence of the ink which received a picture, and there is many resistance is required, and vinyl resin, such as a polyvinyl butyral and polyvinyl acetate, is used as a good thing. As other ingredients, polyacrylic acid, polyacrylic ester, polymethacrylic acid, polymethacrylic acid ester, etc. are used.

[0017] Moreover, in order to raise the televising nature of ink, it is effective to also make this resin contain a particle (filler). As a filler, by the non-subtlety particle, although it is acrylic resin, styrene resin, formaldehyde resin, benzoguanamine resin, silicone resin, fluorine resin, etc., from the point of transparency, acrylic resin is desirable in impalpable powder silicic acid and an organic particle. Moreover, the addition of a filler has 1 - 10 desirable % of the weight to 100 % of the weight of television layers.

[0018] The ingredient of the matrix-like protection-from-light layer (5) in invention of the first of this invention is a black resin constituent which constitutes resin, protection-from-light material, a dispersant, a solvent, etc. as a principal component. It is characterized by using carbon black for the protection-from-light material as an ingredient which constitutes this black resin constituent. Protection from light can obtain a very good matrix-like protection-from-light layer by using carbon black.

[0019] The black resin constituent in this invention can be made to contain a photopolymerization nature monomer, a photopolymerization nature initiator, etc. Thereby, photosensitivity can be given to a black resin constituent, and in case a matrix-like protection-from-light layer is formed, the resist for patterning becomes unnecessary.

[0020] In the black resin constituent in this invention, the blending ratio of coal of carbon black is 50 - 120 % of the weight to 100 % of the weight of resin which constitutes a black resin constituent, and it is desirable that it is 70 - 100 % of the weight. Thereby, optical density of a matrix-like protection-from-light layer is made as for ***** to 3.0 or more. Sufficient protection-from-light nature is not obtained as the blending ratio of coal of carbon black is 50 or less % of the weight. It is in the inclination it to become difficult for the sensibility of a black resin constituent to fall although sufficient protection-from-light nature is obtained as it is 120 % of the weight or more, and to be in the inclination patterning becomes impossible, and for a black resin constituent to distribute to homogeneity.

[0021] The black resin constituent in invention of the second of this invention used for formation of a matrix-like protection-from-light layer Acrylic resin, coloring matter, a dispersant, a polymerization nature monomer, a polymerization initiator, and a solvent are used as a principal component. It is characterized by using the mixture of the organic pigment formed into false black combining a yellow pigment, red pigments, and a blue pigment, combining the yellow pigment of the organic pigments which have light transmission nature in a light field as coloring matter, a blue pigment, and a purple pigment. Thus, if it forms false black combining the blue pigment of a specific color, the value of the chromaticity coordinate in xy chromaticity diagram of the color of a matrix-like protection-from-light layer will become a thing near the value of illuminant C, and the protection-from-light nature in all light fields will be obtained.

[0022] moreover -- in order to make the value of the chromaticity coordinate in xy chromaticity diagram of the color of the mixture into the thing near the value of illuminant C combining a yellow pigment, a blue pigment, and a purple pigment in the black resin constituent used for formation of a matrix-like protection-from-light layer -- the range of 1:1:1-2:2:1 -- the rate of the range of 1:1:1 to 1.3:1.3:1 is comparatively preferably good. moreover -- in order to make the value of the chromaticity coordinate in xy chromaticity diagram of the color of the mixture into the thing near the value of illuminant C combining a yellow pigment, red pigments, and a blue pigment -- the range of 1:1:1-1:2:2 -- the rate of the range of 1:1:1 to 1:1.5:1.5 is comparatively preferably good.

[0023] Moreover, in order to raise more the protection-from-light nature of the black resin constituent used for formation of a matrix-like protection-from-light layer, it is desirable to make the mixture of the above-mentioned organic pigment contain carbon black. In this case, the content of carbon black is 5 - 20 % of the weight preferably one to 30% of the weight to 100 % of the weight of mixture of an organic

pigment. Thereby, the optical density of a matrix-like protection-from-light layer can be held or more to 2.5. Sufficient protection-from-light nature is not obtained as the content of carbon black is 1 or less % of the weight. It is in the inclination it to become difficult for the sensibility of a black resin constituent to fall although sufficient protection-from-light nature is obtained as it is 30 % of the weight or more, and to be in the inclination patterning becomes impossible, and for a black resin constituent to distribute to homogeneity.

[0024] The black resin constituent in this invention can be made to contain a photopolymerization nature monomer, a photopolymerization nature initiator, etc. Thereby, photosensitivity can be given to a black resin constituent, and in case a matrix-like protection-from-light layer is formed, the resist for patterning becomes unnecessary.

[0025] As a yellow pigment used for the mixture of the organic pigment in this invention Nova palm yellow HR-01 (C. I.PigYellow83), PARIO toll yellow K-0961HD (C. I.PigYellow138), The PARIO toll yellow L1820 (C. I.PigYellow139), LumogenYellowD0790 (C. I.PigYellow101), SicoYellowD0951 (C. I.PigYellow3), SicoYellowD1150 (C. I.PigYellow74), SicoYellowD1250 (C. I.PigYellow1), SicoFastYellowD1350 (C. I.PigYellow13), SicoFastYellowNB-D1760 (C. I.PigYellow83), SicominYellowD1120 (C. I.PigYellow34), etc. are raised.

[0026] moreover, as red pigments used for the mixture of the organic pigment in this invention Permanent carmine FBB-02 (C. I.PigRed146), SHINKASHA red BRT-796D (C. I.PigViolet19), Chromophthal red BRN (C. I.PigRed144), the HOSUTA palm pink E (C. I.PigRed146) Chromophthal red A2B (C. I.PigRed177), FanalPinkD4680 (C. I.PigRed169), FanalPinkD4810 (C. I.PigRed168), FanalPink4830 (C. I.PigRed81), etc. are raised.

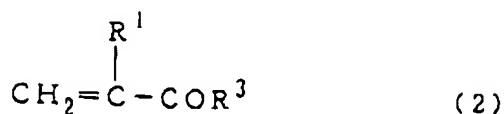
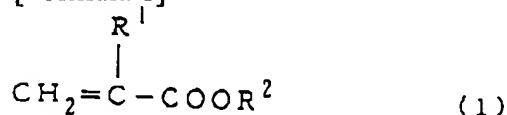
[0027] Moreover, as a blue pigment used for the mixture of the organic pigment in this invention, Heliogen Blue D-7565 (C. I.PigBlue16), Heliogen Blue L6700F (C. I.PigBlue15:6), Heliogen Blue D7072D (C. I.PigBlue15:3), Heliogen Blue D6900D (C. I.PigBlue15:1), Heliogen Blue D6870D (C. I.PigBlue15:2), Heliogen Blue D7100D (C. I.PigBlue15:4), etc. are raised.

[0028] Moreover, as a purple pigment used for the mixture of the organic pigment in this invention, FanalVioletD5460 (C. I.PigViolet 145175:1), FanalVioletD5480 (C. I.PigViolet 145170:2), FanalVioletD6060 (C. I.PigViolet 3942555:2), FanalVioletD6070 (C. I.PigViolet 3942555:2), the RIONO gene violet RL (C. I.PigViolet2351319), etc. are raised.

[0029] As resin which constitutes the black resin constituent in the first of this invention, and the second invention, the acrylic resin which is excellent in dispersibility, thermal resistance, alkali development property, transparency, etc. is desirable, and the resin which makes a configuration unit the acrylic monomer expressed with a chemical formula (1) and (2) can be used as such acrylic resin, for example.

[0030]

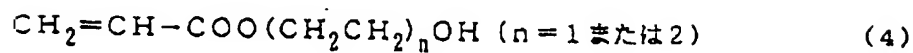
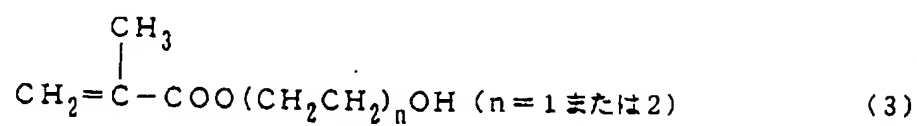
[Formula 1]



[0031] The acrylic monomer expressed with the above-mentioned chemical formula (1) and (2) is acrylic Nomar who specifically expresses with following chemical formula (3) - (21).

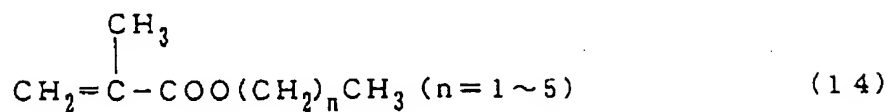
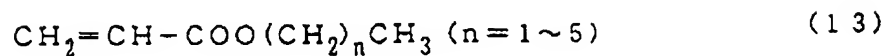
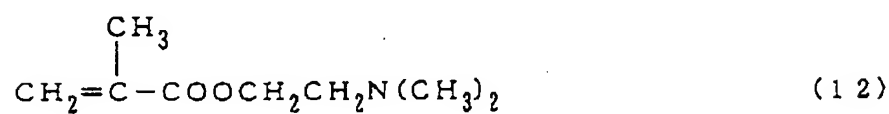
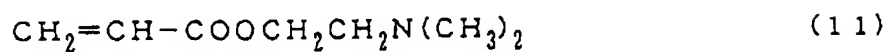
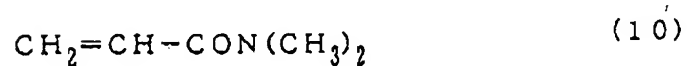
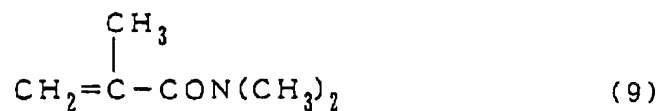
[0032]

[Formula 2]



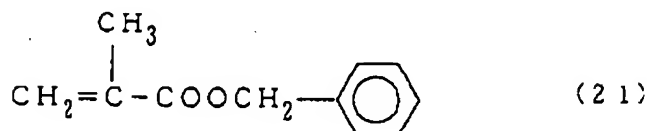
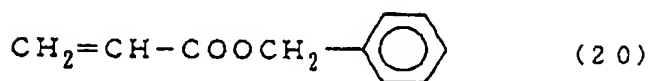
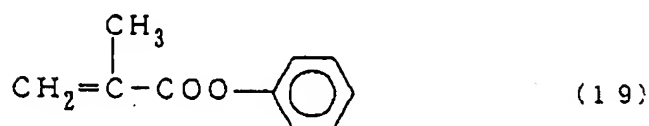
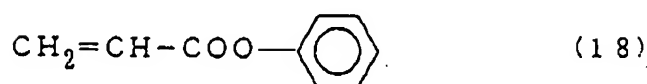
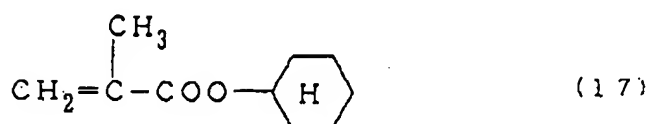
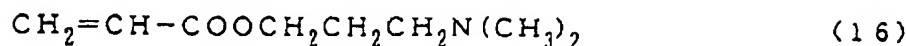
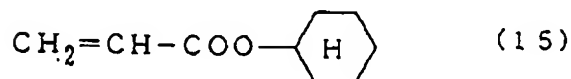
[0033]

[Formula 3]



[0034]

[Formula 4]



[0035] The acrylic resin in this invention is not limited to what is made to carry out the polymerization of a kind of the above-mentioned acrylic monomer, and is obtained, and the resin which chooses several sorts suitably, they are made to carry out copolymerization, and is obtained can also be used for it. Moreover, in addition to the above-mentioned acrylic monomer, the resin which is made to carry out copolymerization of other monomers in which a polymerization is possible, for example, glycidyl methacrylate, acrylonitrile, vinyl acetate, N-vinyl pyrrolidone, the tetrahydrofurfuryl methacrylate, etc., and is obtained can also be used.

[0036] As a photopolymerization nature monomer in this invention, there are monofunctional, two organic functions, three organic functions, and polyfunctional monomer. As a monofunctional monomer, nonylphenyl carbitol acrylate, As a 2 organic-functions monomer, 2-hydroxy-3-phenoxypropylacrylate, 2-ethylhexyl carbitol acrylate, etc. As a 3 organic-functions monomer, tripropylene glycol diacrylate, polyethylene-glycol diacrylate, tetraethylene glycol diacrylate, etc. As polyfunctional monomer, trimethylolpropane triacrylate, a pentaerythritol thoria chestnut rate, tris (2-hydroxyethyl) isocyanate, etc. Trimethylol propane tetraacrylate, dipentaerythritol PENTA, or hexa acrylate is mentioned.

[0037] As a photopolymerization initiator in this invention, triazine compound, an imidazole system compound, a benzophenone system compound, etc. are mentioned. As triazine compound, piperonyl-s-triazine, 2 and 4, 6-tris (TORIKURORO methyl)-s-triazine, 2-(p-methoxy styryl)-4, 6-bis (TORIKURORO methyl)-s-triazine, The 2-phenyl -4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(p-methoxyphenyl)-4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(p-chlorophenyl)-4, 6-bis

(TORIKURORO methyl)-s-triazine, 2-(4'-methoxy-1'-naphthyl)-4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(N-isofrond ROKISHI carbonylmethyl-3'-carbazolyl)-4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(N-(2"-methoxy-1"-methylethoxy carbonylmethyl)-3'-carbazolyl)-4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(N-SHIKUROHEKI siloxy carbonylmethyl-3'-carbazolyl)-4, 6-bis(TORIKURORO methyl)-s-triazine, 2-(4-methylthio phenyl)-Bis(4, 6-TORIKURORO methyl)-s-triazine, 2-(4-methoxy-beta-styryl)-Bis(4, 6-TORIKURORO methyl)-s-triazine, 2-(3-chlorophenyl)-Bis(4, 6-TORIKURORO methyl)-s-triazine etc. is mentioned.

[0038] As an imidazole system compound, moreover, 2-(2, 3-dichlorophenyl)-4, a 5-diphenyl-imidazole dimer, 2-(2, 3-dichlorophenyl)-4, a 5-bis(3-methoxyphenyl)-imidazole dimer, 2-(2, 3-dichlorophenyl)-4, a 5-bis(4-methoxyphenyl)-imidazole dimer, 2-(2, 3-dichlorophenyl)-4, a 5-bis(4-chlorophenyl)-imidazole dimer, 2-(2, 3-dichlorophenyl)-4, 5-bis(2-furyl)-imidazole, 2, and 2'-bis(2-chlorophenyl)-4, 5, 4', and 5' -- the - tetra-phenyl -1 and 2' - biimidazole etc. is mentioned.

[0039] Moreover, as a benzophenone system compound, a - dimethyl-4-methoxybenzophenone, and benzophenone, benzoylbenzoic acid, methyl o-benzoylbenzoate, 4-phenylbenzo phenon, hydroxy benzophenone, acrylic-ized benzophenone, 4-benzoyl-4'-methyl-diphenyl sulfide, 3, and 3'4, 4'-dimethylamino benzophenone etc. is mentioned.

[0040] Moreover, as a dispersant which constitutes the black resin constituent in this invention, organic pigment derivatives, such as alkyl benzene sodium sulfonate, the Pori fatty-acid salt, fatty-acid salt alkyl phosphate, and tetra-alkyl ammonium salt, polyester, etc. are raised with ionic surfactants, such as polyoxyethylene alkyl ether, with a nonionic surfactant, for example. A dispersant may use one kind independently, and may mix and use two or more kinds.

[0041] As a solvent which constitutes the black resin constituent in this invention, it is used choosing suitably and toluene, a xylene, ethylcellosolve, ethylcellosolve acetate, JIKURAIMU, a cyclohexanone, etc. are raised from points, such as the spreading nature of a black resin constituent, and distributed stability.

[0042] Next, combination of each component of the black resin constituent in this invention is explained. that from which it becomes difficult for the spreading fitness of a black resin constituent to get worse at 5 or less % of the weight and 40 % of the weight or more, and for the amount of solid content of a black resin constituent to apply the good film to desired thickness by the spin coater, a roll coater, etc. to 100 % of the weight of black resin constituents -- it is -- such -- ** -- it is 15 - 20 % of the weight preferably about 10 to 30% of the weight.

[0043] Since the protection-from-light engine performance will worsen when a matrix-like protection-from-light layer is formed if the rate of protection-from-light material has too little protection-from-light material, in case thickness will be thickened, consequently for example, the orientation film is formed, trouble is caused, and the display quality of a display may be spoiled. Moreover, when there was too much protection-from-light material, it becomes difficult to distribute protection-from-light material and a matrix-like protection-from-light layer is formed on the other hand, membranous adhesion may fall. The 70 - 100 weight section of the rate of the carbon black as protection-from-light material is a good better thing to the acrylic resin 100 weight section. Moreover, the 100 - 150 weight section of the rate of the mixture of the organic pigment as protection-from-light material is a good better thing to the acrylic resin 100 weight section.

[0044] Since uniform distribution will become difficult and distributed stability will get worse if the rate of the dispersant which constitutes the black resin constituent in this invention has too few dispersants, more than 1 weight section is a good better thing to the protection-from-light material 100 weight section.

[0045] Since the thickness for obtaining sufficient optical density will become thick if are not obtained and there is too much sufficient residual membrane sensibility if there are too few additions of a photopolymerization nature monomer, the 20 - 150 weight section is a good better thing to the acrylic resin 100 weight section. Moreover, 10 - 30 weight section of the addition of a photopolymerization nature initiator is a good better thing to the photopolymerization nature monomer mull 100 weight section.

[0046] Moreover, the black resin constituent in this invention can be prepared according to a conventional method. For example, acrylic resin is diluted with a solvent, the mixture of carbon black or an organic pigment etc. is added as a dispersant and protection-from-light material to the diluent, homogeneity is distributed by the bead mill disperser, and a black resin constituent is obtained by adding a solvent and mixing so that the amount of solid content may become 15 - 20% of the weight.

[0047] The photoresist film is formed after applying to desired thickness by the spin coater, a roll coater, etc. on the television layer formed on the transparence substrate using this black resin constituent, exposure, development, and etching are performed through a photo mask, and a matrix-like protection-from-light layer is obtained by baking hardening after frilling of the resist film.

[0048] Let coloring matter, resin, and a solvent be principal components as an ingredient of the coloring ink in this invention. A color, a pigment, etc. are used as coloring matter. As resin, casein, gelatin, poly vinyl alcohol, a carboxymethyl acetal, polyimide resin, acrylic resin, an epoxy resin, melanin resin, etc. are used, and it is suitably chosen by relation with coloring matter. Acrylic resin is desirable in case thermal resistance and lightfastness are required.

[0049] In order to raise distribution of the coloring matter to resin, a dispersant may be used and organic pigment derivatives, such as alkyl benzene sodium sulfonate, the Pori fatty-acid salt, fatty-acid salt alkyl phosphate, and tetra-alkyl ammonium salt, polyester, etc. are raised, for example as ionic surfactants, such as polyoxyethylene alkyl ether, as a nonionic surfactant as a dispersant, for example. A dispersant may use one kind independently, and may mix and use two or more kinds. As a solvent, it passes besides solubility, the Tokiyasu quality, drying, etc. are required, and it is suitably chosen by the relation between coloring matter and resin.

[0050] Transparency, adhesion, etc. are searched for other than thermal resistance, chemical resistance, surface smoothness, and barrier property, and, as for a flat layer, thermosetting acrylic resin, urethane system resin, polyglycidylmethacrylate system resin, silica system inorganic material, etc. are used as an ingredient. And like a black resin constituent, using a spin coater, a roll coater, etc., the formation approach of a flat layer is applied to the thickness of about 1-2 micrometers, and is formed.

[0051] what depends formation of the television layer (3) on the transparence substrate (2) of the color filter for displays in this invention (1) on a spin coater, a roll coater, etc. -- it is -- moreover, formation of a matrix-like protection-from-light layer (5) -- for example, photograph RISOGURAFII -- it is based on law. Moreover, formation of the pattern-like coloring layer (4) to a television layer (3) top is based on the ink jet method.

[0052] That is, in drawing 1 and one example shown in drawing 2, in order for the ink particle injected from the nozzle of an ink jet to disperse or to prevent beginning to bleed, first, the ink for television layers is applied on a transparence substrate (2) by the spin coater, a roll coater, etc., and a television layer (3) is formed. next, this television layer (3) top -- a matrix-like protection-from-light layer (5) -- photograph RISOGURAFII -- it forms by law and a pattern-like coloring layer (4) is formed by the ink jet method on the television layer (3) between this matrix-like protection-from-light layer (5). Thus, in order to form a pattern-like coloring layer (4), neither scattering of the ink particle injected from the nozzle nor a blot of ink is generated, and the pixel configuration of a color filter is clear and a pixel edge is sharp, the optical density of a matrix-like protection-from-light layer is high, and serves as a high color filter for displays of contrast.

[0053] As ink jet equipment to be used, there are a piezo conversion method and a thermal-conversion method by difference of the regurgitation approach of ink, and especially a piezo conversion method is suitable. The equipment which has arranged about 5-80 micrometers and three heads as about 5-100kHz and a diameter of a nozzle, and included 1-30 nozzles in one head is suitable for the particle-sized frequency of ink. Moreover, heating etc. may be hardened after formation of a pattern-like coloring layer (4) if needed.

[0054]

[Example] The example of this invention is explained concretely below.

It added, and the coating liquid for <example 1> (production of television layer) television layers stirred, it emulsion-ized alumina sol 6g, polyvinyl alcohol 20g, and 74g of water, and prepared it. On alkali free

glass (the Corning, Inc. make, lot number 7059), the coating liquid for television layers was formed by the roll coater at about 0.8-micrometer paint film. Heat hardening of a paint film was performed for 20 minutes at 100 degrees C.

[0055] (Preparation of a black resin constituent) The methacrylic-acid 20 section, the methyl methacrylate 10 section, the butyl methacrylate 55 section, and the hydroxy ethylene methacrylate 15 section were dissolved in ethylcellosolve 300g, the azobis isobutyl nitril 0.75 section was added under nitrogen-gas-atmosphere mind, and acrylic resin was obtained by the reaction of 5 hours at 70 degrees C. To 100g of obtained acrylic resin, as carbon black 90g and a dispersant, 10g was added, SORUSU pass **5000 were kneaded with 3 rolls, it diluted with ethylcellosolve and the black resin constituent was obtained so that resin concentration might become 10%.

[0056] (Production of a matrix-like protection-from-light layer) By the spin coater, the above-mentioned black resin constituent was formed on the television layer (3) at about 1.0-micrometer paint film. The protection-from-light layer of a black resin constituent was formed by the heat hardening for 20 minutes at 70 degrees C. Then, a mask is minded and they are 200 mJ/cm². UV light exposure was performed and it rinsed in the sodium-carbonate water solution 2.5%. Next, heat hardening for 60 minutes was performed at 200 degrees C, and the matrix-like protection-from-light layer was obtained.

[0057] (Preparation of coloring ink) The methacrylic-acid 20 section, the methyl methacrylate 10 section, the butyl methacrylate 55 section, and the hydroxy ethylene methacrylate 15 section were dissolved in ethylcellosolve 300g, the azobis isobutyl nitril 0.75 section was added under nitrogen-gas-atmosphere mind, and acrylic resin was obtained by the reaction of 5 hours at 70 degrees C. The obtained acrylic resin was diluted with ethanol and used as the diluent of acrylic resin so that resin concentration might become 10%.

[0058] 9.0g of pigments and 0.9g of dispersants were added to 90.1g of this diluent, it kneaded with 3 rolls, and red and each green and blue coloring varnish were obtained. To each of this coloring varnish 100g, trimethylol propane acrylate 5.4g and 1.8g (made in Sanwa Chemical, lot number MS-21) of melamine resin were added, viscosity adjusted to 3cps by ethanol, and coloring ink was obtained.

[0059] (Production of a coloring layer) Using this coloring ink, the pattern-like coloring layer (4) of each color was formed, and the pattern-like coloring layer (4) with a line breadth of about 100 micrometers was obtained after the heat hardening of 1 hour at 200 degrees C. Thus, neither scattering of the ink particle injected from the nozzle nor a blot of ink was generated, the optical density of a matrix-like protection-from-light layer was high, and the color filter for displays which consists of an obtained pattern-like coloring layer (4) was a high color filter for displays of contrast, and the pixel configuration of a color filter was clear and a pixel edge was sharp. Moreover, the display quality of the display using the color filter for displays obtained by doing in this way was good.

[0060] Preparation of the coating liquid for <example 2> (production of television layer) television layers and production of a television layer are the same as that of an example 1.

[0061] (Preparation of a black resin constituent) The methacrylic-acid 20 section, the methyl methacrylate 10 section, the butyl methacrylate 55 section, and the hydroxy ethylene methacrylate 15 section were dissolved in ethylcellosolve 300g, the azobis isobutyl nitril 0.75 section was added under nitrogen-gas-atmosphere mind, and acrylic resin was obtained by the reaction of 5 hours at 70 degrees C. It diluted with ethylcellosolve and the acrylic resin diluent was obtained so that the resin concentration of the obtained acrylic resin might become 20% of the weight.

[0062] As 80g of this obtained acrylic resin diluent, and a yellow pigment, PARIO toll yellow L1820 (C. I.PigYellow139, BASF A.G. make) 9.3g, As a blue pigment, Heliogen Blue L6700F (BASF A.G. make) 7.2g, RIOGEN violet RL(Toyo Ink stock company make) 7.2g was added as a purple pigment, and SORUSU pass 2000(made in Seneca) 2g was added as a dispersant, and it distributed for 3 hours, cooling by the bead mill disperser. These dispersion liquid were diluted with ethylcellosolve so that it might become 15 % of the weight of solid content, and the black resin constituent was obtained.

[0063] (Production of a matrix-like protection-from-light layer) By the spin coater, the above-mentioned black resin constituent was formed on the television layer (3) at about 1.0-micrometer paint film. The protection-from-light layer of a black resin constituent was formed by the heat hardening for 20 minutes

at 70 degrees C. Then, a mask is minded and they are 200 mJ/cm². UV light exposure was performed and it rinsed in the sodium-carbonate water solution 2.5%. Next, heat hardening for 60 minutes was performed at 200 degrees C, and the matrix-like protection-from-light layer was obtained.

[0064] (Preparation of coloring ink)

(Production of a coloring layer) Preparation of coloring ink and production of a coloring layer are the same as that of an example 1. Neither scattering of the ink particle injected from the nozzle nor a blot of ink was generated, the optical density of a matrix-like protection-from-light layer was high, and the color filter for displays which consists of a pattern-like coloring layer (4) obtained as mentioned above was a high color filter for displays of contrast, and the pixel configuration of a color filter was clear and a pixel edge was sharp. Moreover, the display quality of the display using the color filter for displays obtained by doing in this way was good.

[0065] It added, and the coating liquid for <example 3> (production of television layer) television layers stirred, it emulsion-ized silica 5g, polyvinyl alcohol 20g, and 75g of water, and prepared it. On alkali free glass (the Corning, Inc. make, lot number 7059), the coating liquid for television layers was formed by the roll coater at about 0.8-micrometer paint film. Heat hardening of a paint film was performed for 20 minutes at 100 degrees C.

[0066] (Preparation of a black resin constituent) To 80g of acrylic resin diluents in an example 2 As a yellow pigment, PARIO toll yellow L1820 (C. I.PigYellow139, BASF A.G. make) 7.2g, As a blue pigment, Heliogen Blue L6700F (BASF A.G. make)9.3g, Chlromophtal red A2B(C. I.PigRed177, Ciba-Geigy make) 7.2g was added as red pigments, and SORUSU pass 2000(made in Seneca) 2g was added as a dispersant, and it distributed for 3 hours, cooling by the bead mill disperser. These dispersion liquid were diluted with ethylcellosolve so that it might become 15 % of the weight of solid content, and the black resin constituent was obtained.

[0067] (Production of a matrix-like protection-from-light layer)

(Preparation of coloring ink)

(Production of a coloring layer) Production of a matrix-like protection-from-light layer, preparation of coloring ink, and production of a coloring layer are the same as that of an example 2.

[0068] Neither scattering of the ink particle injected from the nozzle nor a blot of ink was generated, the optical density of a matrix-like protection-from-light layer was high, and the color filter for displays which consists of a pattern-like coloring layer (4) obtained as mentioned above was a high color filter for displays of contrast, and the pixel configuration of a color filter was clear and a pixel edge was sharp. Moreover, the display quality of the display using the color filter for displays obtained by doing in this way was good.

[0069] To 78g of acrylic resin diluents in the <example 4> (preparation of black resin constituent) example 2 As a yellow pigment, PARIO toll yellow L1820 (C. I.PigYellow139, BASF A.G. make) 7.7g, As a blue pigment, Heliogen Blue L6700F (BASF A.G. make)6.1g, RIOGEN violet RL(Toyo Ink stock company make) 6.1g and carbon black 2.1g were added as a purple pigment, and SORUSU pass 2000 (made in Seneca) 2.2g was added as a dispersant, and it distributed for 3 hours, cooling by the bead mill disperser. These dispersion liquid were diluted with ethylcellosolve so that it might become 15 % of the weight of solid content, and the black resin constituent was obtained.

[0070] (Production of a television layer)

(Production of a matrix-like protection-from-light layer)

(Preparation of coloring ink)

(Production of a coloring layer) Production of a matrix-like protection-from-light layer, preparation of coloring ink, and production of a coloring layer are the same as that of an example 2.

[0071] Neither scattering of the ink particle injected from the nozzle nor a blot of ink was generated, the optical density of a matrix-like protection-from-light layer was high, and the color filter for displays which consists of a pattern-like coloring layer (4) obtained as mentioned above was a high color filter for displays of contrast, and the pixel configuration of a color filter was clear and a pixel edge was sharp. Moreover, the display quality of the display using the color filter for displays obtained by doing in this way was good.

[0072] To 78g of acrylic resin diluents in the <example 5> (preparation of black resin constituent) example 2 As a yellow pigment, PARIO toll yellow L1820 (C. I.PigYellow139, BASF A.G. make) 6.1g, As a blue pigment, Heliogen Blue L6700F (BASF A.G. make) 7.7g, Chromophthal red A2B(C. I.PigRed177, Ciba-Geigy make) 6.1g and carbon black 2.1g were added as red pigments, and SORUSU pass 2000 (made in Seneca) 2.2g was added as a dispersant, and it distributed for 3 hours, cooling by the bead mill disperser. These dispersion liquid were diluted with ethylcellosolve so that it might become 15 % of the weight of solid content, and the black resin constituent was obtained.

[0073] (Production of a television layer)

(Production of a matrix-like protection-from-light layer)

(Preparation of coloring ink)

(Production of a coloring layer) Production of a matrix-like protection-from-light layer, preparation of coloring ink, and production of a coloring layer are the same as that of an example 2.

[0074] Neither scattering of the ink particle injected from the nozzle nor a blot of ink was generated, the optical density of a matrix-like protection-from-light layer was high, and the color filter for displays which consists of a pattern-like coloring layer (4) obtained as mentioned above was a high color filter for displays of contrast, and the pixel configuration of a color filter was clear and a pixel edge was sharp. Moreover, the display quality of the display using the color filter for displays obtained by doing in this way was good.

[0075] On the television layer in the <example 1 of comparison> example 2, a matrix-like protection-from-light layer was not produced, but the coloring layer was produced identically to an example 2 using the same coloring ink as an example 2. The blot occurred in the obtained pattern-like coloring layer, and the pixel configuration of a color filter was not clear in it.

[0076] In the <example 2 of comparison> example 2, a television layer was not produced, but the matrix-like protection-from-light layer was produced, and the coloring layer was produced identically to an example 2 using the same coloring ink as an example 2. Nonuniformity occurred in the obtained pattern-like coloring layer, and it was not good as a pixel of a color filter in it.

[0077]

[Effect of the Invention] The television layer by which this invention was formed at least on a transperence substrate and this transperence substrate, In the color filter for displays possessing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer Since the protection-from-light material of a matrix-like protection-from-light layer is carbon black, in case it forms by the ink jet method Neither scattering of the ink particle injected from the nozzle nor a blot of ink is generated, and and the pixel configuration of a color filter is clear and a pixel edge is sharp, the optical density of a matrix-like protection-from-light layer is high, and serves as a high color filter for displays of contrast. Moreover, since the flat layer is formed all over the transperence substrate with which the pattern-like coloring layer was formed, as for the color filter top for displays, the color filter for displays in this invention will become flat.

[0078] Moreover, the television layer by which this invention was formed at least on a transperence substrate and this transperence substrate, In the color filter for displays possessing the pattern-like coloring layer formed by the ink jet method between the matrix-like protection-from-light layer formed on this television layer, and the matrix-like protection-from-light layer on this television layer The black resin constituent used for formation of a matrix-like protection-from-light layer Acrylic resin, Coloring matter, a dispersant, a polymerization nature monomer, a polymerization initiator, and a solvent are used as a principal component. The yellow pigment of the organic pigments to which coloring matter has light transmission nature in a light field, a blue pigment, and a purple pigment are combined. Or since it is the mixture of the organic pigment formed into false black combining a yellow pigment, red pigments, and a blue pigment Scattering of the ink particle injected from the nozzle when forming by the ink jet method, Do not generate a blot of ink, the pixel configuration of a color filter is clear, and a pixel edge is sharp, and the value of the chromaticity coordinate in xy chromaticity diagram of the color of a matrix-like protection-from-light layer It becomes a thing near the value of illuminant C, and the

protection-from-light nature in all light fields is obtained, and the optical density of a matrix-like protection-from-light layer is high, and serves as a high color filter for displays of contrast.

[0079] Moreover, since coloring matter makes the mixture of an organic pigment contain carbon black, it can hold the optical density of a matrix-like protection-from-light layer or more to 2.5.

[0080] Moreover, since the optical density of a matrix-like protection-from-light layer is 3.0 or more, the optical density of this invention of a matrix-like protection-from-light layer is high, and it serves as a high color filter for displays of contrast.

[0081] Moreover, since this invention is the display equipped with the color filter for displays by the above-mentioned invention, it serves as a display with sufficient display quality.

[Translation done.]